REMARKS/ARGUMENTS

The arguments and amendments submitted herein incorporate the patentability arguments and amendments Applicants discussed with the Examiner during the phone interview on January 12, 2007. Applicants submit that the amendments and arguments presented herein make the substance of the phone interview of record to comply with 37 CFR 1.133. During the interview, the Examiner said he would reconsider the rejection in view of the discussed amendments and arguments.

1.   Amended Claims 17-24 Comply with Sections 101

The Examiner rejected claims 17-24 as directed to non-statutory subject matter (35 U.S.C. §101) on the grounds that the article of manufacture could cover "transmission" media, which the Patent Office regards as non-statutory. (Final Office Action, pg. 2)

During the phone interview, the Examiner said that changing the claims to read that the article of manufacture comprises "computer readable storage media" would overcome the Section 101 rejection. Applicants amended claim 17 to recite that the article of manufacture comprises a hardware device including hardware logic or a computer readable storage medium including computer executable code. The Specification discloses this requirement in para. [0021] on pgs. 8-9.

Applicants submit that this amendment overcomes the Section 101.

2.   Claims 1, 2, 9-16, 17, and 19 are Patentable Over the Cited Krishnaiyer

The Examiner rejected claims 1, 2, 9-16, 17, and 19 as anticipated (35 U.S.C. §102(e)) by Krishnaiyer (U.S. Patent App. Pub. No. 2004/0123041).

Amended claims 1, 9, and 17 require processing a prefetch command having at least one conditional statement, wherein the conditional statement specifies a condition with respect to content of a received Input/Output (I/O) request and at least one block to prefetch from storage to cache in response to determining that the content of the received I/O request satisfies the condition of the conditional statement; receiving an I/O request directed to a target block in the storage; determining whether the content of the received I/O request satisfies the condition specified in the conditional statement of one prefetch command; and prefetching the at least one block to prefetch indicated in the conditional statement of one prefetch command into the cache

in response to determining that the content of the I/O request satisfies the conditional statement of one prefetch command.

Applicants amended these claims as discussed during the phone interview to include the requirements of claims 6, 14, and 22 and to further clarify that the condition of the conditional statement specifies a condition with respect to the content of a received I/O request. This requirement that the specified condition is with respect to the content of the received I/O is disclosed in at least para. [0011], pg. 4 of the Specification. In adding the requirements of claims 6, 14, and 22, Applicants changed "target block" to "content of the received I/O request", such that in the amended claims the determination is done with respect to the content of the received I/O request.

The Examiner cited paras. [0024]-[0029] of Krishnaiyer as disclosing the requirements of these claims. (Final Office Action, pgs. 3-4) Applicants traverse.

The cited paras. [0024-0029] discuss adaptive prefetching code having a loop such that if a condition determines that there is a data prefetch (para. [0024]), then fields of data are prefetched (para. [0025]).

Although the cited Krishnaiyer discusses prefetching if a condition is satisfied, the condition mentioned in Krishnaiyer is whether there is a data prefetch, "condition 1 determines if there is a data prefetch". (Krishnaiyer, para. [0024]. Nowhere does the cited Krishnaiyer anywhere disclose the claim requirement of a prefetch command having a conditional statement specifying a condition with respect to content of the received I/O request. Instead, the condition mentioned in the cited paras. [0024-0029] is independent of the content of the received I/O request and is instead based on whether there is a data prefetch.

The Examiner did not cite Krishnaiyer as disclosing the requirements of claims 6, 14, and 22 added to claims 1, 9, and 17. Consequentially, the cited Krishnaiyer does not disclose the added claim requirements of determining whether the content of the received I/O request satisfies the condition specified in the conditional statement of one prefetch command; and prefetching the at least one block to prefetch indicated in the conditional statement of one prefetch command into the cache in response to determining that the content of the I/O request satisfies the conditional statement of one prefetch command.

Accordingly, amended claims 1, 9, and 17 are patentable over the cited art because the cited Krishnaiyer does not disclose all the claim requirements.

Claims 2, 10-16, 19, and 25 are patentable over the cited art because they depend from one of claims 1, 9, and 17, which are patentable over the cited art for the reasons discussed above. The below discussed dependent claims provide additional grounds of patentability over the cited art.

Amended claims 2 and 10 recite that the conditional statement specifies a block that when accessed causes the prefetching of the at least one block to prefetch specified in the conditional statement, wherein processing the prefetch command comprises generating the prefetch command using predictive analysis techniques to determine blocks anticipated to be accessed if a specified block is accessed, wherein the conditional statements specifies to prefetch the at least one block anticipated to be accessed if the specified block is accessed.

Applicants amended claims 2, 10, and 18 to change "indicate" to "specified" to clarify the claim language.

As discussed, the cited paras. [0024-0029] mention conditional prefetch code such that if the condition determines there is a data prefetch, then data is prefetched. However, nowhere is there any disclosure in the cited paras. [0024-0029] of the claim requirement that the condition specifying a block indicates a block that when accessed causes the prefetching of the at least one block indicated in the conditional statement. Instead, the condition mentioned in the cited . [0024-0029] determines if there is a data prefetch. This cited condition does not disclose the claimed condition of a block accessed in the I/O request that causes the prefetching of the blocks also indicated in the prefetch command..

Accordingly, claims 2 and 10 provide additional grounds of patentability over the cited art because the cited Krishnaiyer does not disclose all the claim requirements.

Amended claims 11 and 19 recite that one conditional statement is satisfied if the content of the I/O request specifies that the I/O request is directed to a specified block in the conditional statement.

Applicants amended claims 3, 11, and 19 to clarify that the conditional statement is satisfied if the content of the I/O request specifies that the I/O request is directed to a specified block.

As discussed, the cited paras. [0024-0029] discuss conditional prefetch code such that if the condition determines if there is a data prefetch, then fields are prefetched. However, nowhere is there any disclosure in the cited paras. [0024-0029] of the claim requirement that the

condition is satisfied if the content of I/O request is directed to the block specified in the conditional statement. Instead, the condition mentioned in the cited . [0024-0029] determines if there is a data prefetch. This cited condition does not disclose the claimed condition of the I/O request being directed to a specified block in the conditional statement.

Accordingly, claim 2 and 19 provide additional grounds of patentability over the cited art because the cited Krishnaiyer does not disclose all the claim requirements.

3.   Claims 1, 9, and 17 are Patentable Over the Cited Ikeuchi

The Examiner rejected claims 1, 9, and 17 as anticipated (35 U.S.C. §102(e)) by Ikeuchi (U.S. Patent App. Pub. No. 2004/0230742).

With respect to claims 1, 9, and 17, the Examiner cited steps 100, 102, 104, and 106 in FIG. 21 and FIG. 18 of Ikeuchi as disclosing the requirements of these claims. (Final Office Action, pg. 4) Applicants traverse.

The cited steps of FIG. 21 mentions that if pre-fetch of the virtual disk is necessary, then a judgment is made whether requesting a prefetch is possible by a judgment condition based on the number of requests in process. (Ikeuchi, paras. [0174-0175], pg. 9). Ikeuchi mentions that determining whether prefetches are possible is based on the load of host I/Os and internal I/Os, (prefetches and write backs) to manage the number of processing requests to the virtual disk. (Ikeuchi, para. [0134], pg. 7).

Nowhere do the cited steps of FIG. 21 anywhere disclose that a prefetch command indicates a conditional statement that specifies a condition with respect to content of a received I/O request and at least one block to prefetch if the content of the I/O request satisfies the condition. The cited Ikeuchi discusses a condition on a prefetch based on the number of processing requests pending against the virtual disk. Although this cited condition may limit prefetch operations, nowhere do the cited steps disclose that a prefetch command itself has a conditional statement specifying a condition with respect to the content of the received I/O request. Instead, the cited condition of Ikeuchi is not based on the content of the I/O request as specified in a condition of a prefetch command, but is instead based on a Dynamic Traffic Control (DTC) module managing the load of requests against the virtual disk. See, para. [0134]. The cited Ikeuchi discusses a condition based on the number of processing requests pending, not the content of a received I/O request as claimed.

Further, the cited Ikeuchi nowhere discloses that a prefetch command indicates a block to prefetch if the condition with respect to the content of the I/O request is satisfied. Instead, Ikeuchi provides a condition to limit prefetching in based on the load against the virtual disk.

The cited FIG. 18 shows a block diagram of modules, such as a cache control module having a module 34-3 for requesting a prefetch due to a read request. See, Ikeuchi, para. [0151], pg. 8.

Although FIG. 18 shows a module for requesting a prefetch request, nowhere does this cited FIG. 18 anywhere disclose that a prefetch command has a conditional statement indicating a condition with respect to content of a received Input/Output request and a block to prefetch if the condition is satisfied.

The Examiner did not cite Ikeuchi as disclosing the requirements of claims 6, 14, and 22 added to claim 1. Consequentially, the cited Ikeuchi does not disclose the added claim requirements of determining whether the content of the received I/O request satisfies the condition specified in the conditional statement of one prefetch command; and prefetching the at least one block to prefetch indicated in the conditional statement of one prefetch command into the cache in response to determining that the content of the I/O request satisfies the conditional statement of one prefetch command.

Accordingly, amended claims 1, 9, and 17 are patentable over the cited Ikeuchi because the cited Ikeuchi does not disclose all the claim requirements.

4.   Claims 1-24 are Patentable Over the Cited Lange

The Examiner rejected claims 1-24 as anticipated (35 U.S.C. §102(e)) by Lange (U.S. Patent App. Pub. No. 2005/0198439).

With respect to claims 1, 9, and 17, the Examiner cited blocks 540, 550, and 560 of FIG. 5 of Lange. (Final Office Action, pgs. 4-5) The cited FIG. 5 describes a method for prefetching data. Lange mentions that a new prefetch sequence begins if a cache miss is detected, i.e., the requested data is not in cache. (Lange, paras. [0063-0064], pgs. 5-6)

Nowhere do the cited steps of Lange anywhere disclose that a prefetch command has a conditional statement specifying a condition with respect to the content of the received I/O request and a block to prefetch if the condition is satisfied. The cited Lange mentions that a prefetch occurs if there is a cache miss, but nowhere discloses that a prefetch command itself

specifies a condition with respect to the content of a received I/O request. Instead, the cited

condition of Lange is independent of any prefetch command and the content of the received I/O

request and is instead based on whether or not there is a cache miss (the requested data is in

cache), which is independent of a condition with respect to the content of the received I/O

request.

   Further, the Examiner has not cited any part of Lange that discloses that a prefetch

command indicates a block to prefetch if the condition is satisfied.

   With respect to the requirements of claims 6, 14, and 22 added to the independent claims

1, 9, and 17, the Examiner cited para. [0042] and FIGs. 5 and 6 of Lange. (Final Office Action,

pgs. 5-6) Applicants traverse.

x The cited para. [0042] mentions a direction selector that establishes an access direction of

memory accesses when a cache miss is detected. When a cache hit occurs, i.e., the requested

data is in cache, it may be undesirable to interrupt the current prefetch sequence. Lange

mentions that selecting the direction only when a cache miss is detected is useful.

   Nowhere does the cited para. [0042] anywhere disclose that a determination is made as to

whether the content of the received I/O request satisfies the condition specified in the conditional

statement of one prefetch command. Instead, the cited para. [0042] discusses determining the

direction of memory access. Further, the cited Lange provides for prefetching upon a cache

miss, i.e., when the requested data is not in cache. Nowhere does the cited Lange disclose that

prefetching occurs when the content of the I/O request satisfies the condition of one prefetch

command. Instead, the cited Lange prefetches if there is a cache miss, not based on whether the

content of the I/O request satisfies a conditional statement indicated in a prefetch command.

   Accordingly, claims 1, 9, and 17 are patentable over the cited Lange because the cited

Lange does not disclose all the claim requirements.

   Claims 2-5, 7, 8, 10-13, 15, 16, 18-21, 23, and 24 are patentable over the cited art

because they depend from one of claims 1, 9, and 17, which are patentable over the cited art for

the reasons discussed above. Moreover, the following dependent claims provide additional

grounds of patentability over the cited art.

   Amended claims 2, 10, and 18 depend from claims 1, 9, and 17 and further require that

the conditional statement specifies a block that when accessed causes the prefetching of the at

least one block to prefetch specified in the conditional statement and that processing the prefetch

command comprises generating the prefetch command using predictive analysis techniques to determine blocks anticipated to be accessed if a specified block is accessed, wherein the conditional statements specifies to prefetch the at least one block anticipated to be accessed if the specified block is accessed.

The Examiner cited FIGs. 5, 6 and paras. [0064-0065] of Lange as disclosing the additional requirements of these claims. (Final Office Action, pg. 5) Applicants traverse.

The cited paras. [0064-0065] mention that a prefetch is performed if there is a cache miss and that a current prefetch sequence may be ended when a new cache miss occurs. FIG. 6 is a flowchart of a method for retrieving a sequence of data items from a main memory.

Nowhere does the cited Lange disclose the claim requirement that the condition specifies a block that when accessed causes the prefetching of the at least one block to prefetch specified in the conditional statement. Instead, the cited Lange mentions that prefetching occurs upon a cache miss. The Examiner has not cited any part of Lange that discloses that a prefetch command conditional statement specifies a block, such that prefetching is performed when the I/O request accesses the specified block.

Accordingly, claims 2, 10, and 18 are patentable over the cited Krishnaiyer because the cited Krishnaiyer does not disclose all the claim requirements.

Amended claims 3, 11, and 19 depend from claims 1, 9, and 17 and further recite that one conditional statement is satisfied if the content of the I/O request specifies that the I/O request is directed to a specified block in the conditional statement.

The Examiner cited para. [0064] with respect to these claims. (Final Office Action, pg. 5)

The cited para. [0064] mentions that a prefetch occurs if there is a cache miss, i.e., the requested data is not in cache. However, nowhere is there any disclosure in the cited Lange of the claim requirement that the condition is satisfied if the content of the I/O request specifies that the I/O request is directed to the block specified in the conditional statement. Instead, the condition mentioned in the cited Lange concerns whether the requested data is in cache, i.e., a cache hit or miss, not whether the content of the I/O request specifies that the I/O request is directed to a specified block indicated in the conditional statement of the prefetch command. There is no disclosure in the cited Lange of a prefetch command specifying a block such that

prefetch occurs if the content of the I/O request specifies that the I/O request is directed to the block specified in the condition.

Accordingly, claims 3, 11, and 19 are patentable over the cited Lange because the cited Lange does not disclose the additional requirements of these claims.

Claim 5, 13, and 21 depend from claims 3, 11, and 19 and further recite that processing the prefetch command further comprises including a duration parameter in the prefetch command indicating a duration of the prefetch command.

The Examiner found that a duration was implicit because the prefetch command lasts for a specified duration of one page or pages or until the buffer is full. (Final Office Action, pg. 6). Applicants traverse.

Although a prefetch operation may have an implicit duration and ends at a point-in-time, the Examiner has not cited any part of Lange that discloses that a prefetch command specifies a duration parameter indicating the duration of the command. Applicant submits that an implicit duration does not disclose the claim requirement of specifying a duration of the prefetch command within the prefetch command.

Accordingly, claims 5, 13, and 21 are patentable over the cited Lange because the cited Lange does not disclose the additional requirements of these claims.

Amended claims 7, 15, and 23 depend from claims 1, 9, and 17 and further require that determining whether the target block satisfies the conditional statement of one prefetch command comprises determining whether the target block satisfies the conditional statement of one unexpired prefetch command.

Applicants amended these claims to depend from base claims 1, 9, and 17 and to recite that the determination is with respect to the content of the I/O request.

The Examiner cited the above discussed steps 540 and 560 of FIG. 5 of Lange as disclosing the additional requirements of these claims. (Final Office Action, pg. 6) Applicants traverse.

As discussed, the cited steps 540 and 560 mention that prefetch begins if there is a cache miss, i.e., the requested data is not in the cache. Nowhere does the cited Lange disclose determining whether the content of the I/O request satisfies the conditional statement of one unexpired prefetch command. The cited Lange does not disclose that a prefetch command expires. Although a prefetch operation may end, nowhere does the cited Lange disclose that a

prefetch command specifying a conditional statement related to the content of an I/O request expires. Moreover, the condition mentioned in the cited Lange for determining whether to perform a prefetch is if the requested data is not in cache, i.e., a cache miss. Nowhere does the cited Lange determine whether the content of the I/O request satisfies a conditional statement of an unexpired prefetch command.

Accordingly, amended claims 7, 15, and 23 are patentable over the cited Lange because the cited Lange does not disclose the additional requirements of these claims.

Claims 8, 16, and 24 depend from claims 1, 9, and 17 and further recite that one conditional statement includes a plurality of branch conditions, wherein each branch condition indicates one block and is associated with at least one block to prefetch, further comprising: prefetching all blocks to prefetch associated with the branch conditions in the conditional statement; and removing blocks to prefetch from cache associated with branch conditions that are not satisfied in response to determining that the block indicated in one branch condition is accessed.

The Examiner cited steps from FIGs. 5 and 6 as disclosing the requirements of these claims. (Final Office Action, pgs. 6-7) Applicants traverse.

As discussed, the cited FIGs. 5 and 6 discuss prefetching if requested data is not in cache, i.e., a cache miss and determining a direction of access of reading the data to retrieve a sequence of data items from the memory. The steps 600-640 discuss prefetching data in sequence, and that a determination is made as to whether to continue with the current prefetch sequence or begin a new prefetch sequence.

Nowhere does the cited Lange disclose prefetching all blocks associated with branch conditions. Instead, the cited step 640 of Lange mentions that a determination is made whether to continue with the current prefetch sequence, and if so, continue prefetching. Nowhere does Lange disclose prefetching all blocks associated with conditions and then removing blocks to prefetch associated with branch conditions that are not satisfied. Instead, the cited Lange only prefetches if the condition of step 640 is satisfied. The Examiner has not cited any part of Lange that first prefetches data associated with conditions, and then removes data associated with conditions not satisfied.

The Examiner cited paras. [0043] and [0064], finding that data prefetched is replaced with newly prefetched data. (Final Office Action, pg. 7) Although the cited Lange may have

previously prefetched data replaced with newly prefetched data, nowhere does Lange disclose removing prefetched data associated with conditions of prefetch commands that are not satisfied. Instead, the cited Lange removes data as a result of overwriting, not based on the claim requirement of whether conditions are satisfied.

Accordingly, claims 8, 16, and 24 are patentable over the cited Lange because the cited Lange does not disclose the additional requirements of these claims.

5.   Added claim 26, 27, 28, 29, 30, and 31 are Patentable Over the Cited Art

Added claims 26, 28, and 30 depend from claims 1, 9, and 17, respectively, and further require that the condition with respect to the content of the I/O request specifies a block in the storage, wherein the content of the I/O request satisfies the condition in response to determining that the I/O request is directed to a target block comprising the block specified in the condition.

Added claims 27, 29, and 31 depend from claims 1, 9, and 17, respectively, and further require that the condition with respect to the content of the I/O request further specifies one of read or write access, wherein the content of the I/O request satisfies the condition in response to determining that the I/O request comprises the read or write access specified in the condition directed to the target block comprising the block specified in the condition.

The added requirements of these claims are disclosed in at least para. [0011], pg. 4 of the Specification.

Applicants submit that these claims are patentable over the cited art because they depend from one of base claims 1, 9, and 17, which are patentable over the cited art for the reasons discussed above, and because the additional requirements of these claims in combination with the base claims provide further grounds of patentability over the cited art.

Conclusion

For all the above reasons, Applicants submit that the are patentable over the art of record. Applicants submit herewith the fee for the added claims and RCE. Nonetheless, should any additional fees be required, please charge Deposit Account No. 09-0449.

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the Examiner believes such contact would advance the prosecution of the case.

Dated: February 13, 2007   By:_____/David Victor/_____

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